Los Alamos
NATIONAL LABORATORY
EST.1943

LA-UR-19-21819
Approved for public release; distribution is unlimited.

Title: Improved Turbulence Parameterization of the Oceanic Mixed Layer using Large Eddy Simulation

Author(s): Van Roekel, Luke

Intended for: Institutional computing viewgraph for annual reporting

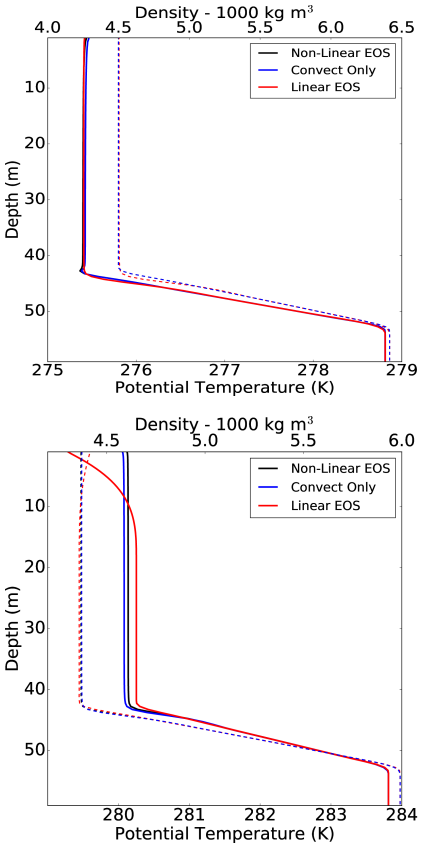
Issued: 2019-03-01

Disclaimer:
Los Alamos National Laboratory, an affirmative action/equal opportunity employer, is operated by Triad National Security, LLC for the National Nuclear Security Administration of U.S. Department of Energy under contract 89233218CNA000001. By approving this article, the publisher recognizes that the U.S. Government retains nonexclusive, royalty-free license to publish or reproduce the published form of this contribution, or to allow others to do so, for U.S. Government purposes. Los Alamos National Laboratory requests that the publisher identify this article as work performed under the auspices of the U.S. Department of Energy. Los Alamos National Laboratory strongly supports academic freedom and a researcher's right to publish; as an institution, however, the Laboratory does not endorse the viewpoint of a publication or guarantee its technical correctness.

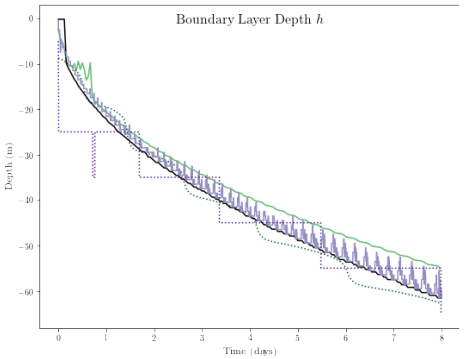
Improved Turbulence Parameterization of the Oceanic Mixed Layer using Large Eddy Simulation

(w17_mpasles)

PI: Luke Van Roekel, T-3, 667-1402, lvanroekel@lanl.gov



- We have greatly expanded our suite of Large Eddy Simulation (LES)
- We have explored the impact of a nonlinear equation of state on boundary layer turbulence (left). For fresh waters entrainment is altered. For salty waters, a cool layer develops at the surface.
- Our new closure (right) faithfully reproduces LES and has less resolution dependence than the current closure.
- Test case database will constrain constants in the new model and help extend our new approach to momentum.



Boundary layer depth evolution for LES (black). Our new scheme (purple) and KPP (green). Two resolutions are considered (dashed = 10m and solid = 1m)

Impact of a nonlinear EOS for (top) *evolution of temperature for low salinity waters. (bottom) higher salinity water.*

LA-UR-XX-XXXXX